



Underwater Investigation

Freshwater snorkeling and scuba diving reveal the habits, habitats, and numbers of Montana's fish.

By Brianna Randall

Sunlight glints off an emerald-green pool in Fish Creek as a tall creature emerges from beneath the surface. Ladd Knotek spits out his snorkel and announces: "Five bigs, one brown, and a medium bull." Then he sinks back into the cold water to count more trout.

Knotek, a fisheries biologist with Montana Fish, Wildlife & Parks, has been snorkeling this Clark Fork River tributary each summer for 11 years. His underwater sorties help him take inventory of the fishery, which in turn helps FWP manage this popular trout stream, located 40 miles northwest of Missoula. ▶▶

PHOTOS: ROB ROBERTS

FACE TIME WITH FISH Above: University of Montana biology students practice scuba diving in Rattlesnake Creek as part of a photography exercise sponsored by the Montana Chapter of the American Fisheries Society. Right: FWP biologist Ladd Knotek takes a quick break from surveying trout in Fish Creek, a Clark Fork River tributary northwest of Missoula.





WHAT'S UP DOWN THERE? Left: FWP and Trout Unlimited biologists discuss their findings after a scuba survey of Fish Creek. Above: Spawning westslope cutthroat trout are visible in a western Montana tributary. Small streams like these can't be surveyed well with snorkeling, nor can powerful rivers like the Yellowstone and Missouri, which are too dangerous. Below: A recreational snorkeler on the Clark Fork River in downtown Missoula warms up before returning to look at bull trout.



CLOCKWISE FROM TOP: LEFT: ROB ROBERTS; PATRICK CLAYTON/ENGBREITSON UNDERWATER PHOTOGRAPHY; ZACH SHATTUCK; ZACH SHATTUCK; ROB ROBERTS

Across the creek is a second snorkeler—Rob Roberts, a Trout Unlimited project manager—who scopes the number, size, and species of fish hiding beneath overhanging banks. Most are westslope cutthroat trout. Rather than stand up and remove his mask, Roberts holds up three fingers, followed by a thumbs-down sign. Snorkelers often use hand signals to increase efficiency. In this case: thumbs up for cutthroats over 12 inches (also called “bigs”), hand flat for fish 7 to 12 inches, and thumbs down for anything smaller than 7 inches.

On the bank, Reuben Frey, an FWP fisheries technician, records the snorkelers' observations on a clipboard. In the largest pools, where dozens of trout swirl and scatter, Knotek and Roberts make several passes and average their counts.

This annual snorkel survey takes place in two different reaches, each about a mile long, which requires a total of nearly six hours in the water. Thus the dry suits. Even though it's August, the water temperature in Fish Creek is an icy 55 degrees—perfect for native trout but freezing for humans. Even with protective gear, the snorkelers shiver during their lunch break in the warm summer sun.

ONLY SOME STREAMS

Knotek first donned a mask on Fish Creek in 2010 as a way to monitor how increased angling pressure and a habitat restoration project were affecting fish populations. Biologists usually use electrofishing to assess fisheries in Montana, putting a battery-powered wand in the water to send out a pulse of electricity that temporarily stuns nearby fish. When fish float to the surface, they're weighed and measured, then released back to the stream. But shocking doesn't work well in Fish Creek.

“It's too sterile,” explains Knotek of the nearly transparent stream. “It's almost like distilled water and doesn't conduct electricity well. Plus, it's so clear the fish see you and spook before you can get close enough to shock any.”

Only a handful of streams have the right conditions to make snorkel surveys feasible as a monitoring tool. Good underwater visibility is essential. Many streams and

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rivers have too much sediment, vegetation, or algae, which can make it tough to see your hand in front of your face, much less trout hiding under logs. Then there's size: Most creeks are too narrow or shallow to snorkel, and most rivers are too big and dangerous. Fish Creek is just right, containing deep pools that hold fish and gentle riffles that snorkelers can easily float over.

“You also get information on habitat use, behaviors, and other aquatic animals like freshwater mussels and crawfish that you don't detect with electrofishing.”



ON THE PROWL Above: Zach Shattuck, FWP native fish species coordinator, looks for Rocky Mountain sculpin (below) in Prickly Pear Creek near East Helena.



According to David Schmetterling, who heads FWP's fisheries research unit, one benefit of snorkeling is that it's a lot easier on the trout, which don't need to be shocked or handled. “You also get information on fish habitat use and behaviors, and on other aquatic animals like freshwater mussels

and crawfish—things you can't detect with electrofishing,” he says. “And it's one of the most fun things many of us biologists get to do in our jobs.”

The big disadvantage with snorkeling is that researchers can't gather specific fish measurements or genetic samples, or implant radio transmitters to follow migratory movements and habitat use.

FWP biologists have been using snorkeling to survey fish populations for years. “We used it for studying bull trout migration and habitat use on the Clark Fork River after the removal of Milltown Dam, to view habitat changes,” Schmetterling says. “And we used it for a statewide crayfish project last summer.” FWP Aquatic Invasive Species Program crews also don snorkeling and scuba gear to look for non-native mussels and other unwanted aquatic animals and plants.

Fisheries biologist Nathan Cook, with the Montana Natural Resource Damage Program, recently snorkeled with a Clark Fork Coalition team to see whether trout are using specific habitat within the upper Clark Fork River Superfund cleanup area. “We were trying to sneak up on fish without disturbing them, to see what kind of habitat they were using. That's something you can't do with electrofishing,” Cook says.

He and two others snorkeled upstream of Deer Lodge to record—and ultimately map—the exact locations of fish in relation to overhanging vegetation or undercut banks.

SPECIALIZED SKILL

Snorkel surveys require specialized skills. “You have to be a good swimmer, know where fish are likely to be in a stream, correctly identify species, and estimate their size,” Cook says. “And you have to be able to do all that without spooking them.” It can also be dangerous, requiring snorkelers to navigate strong stream currents and hazardous logjams.

That's why Knotek recruited Roberts to help out on Fish Creek. Roberts, who has snorkeled recreationally for 25 years, first used snorkeling at Trout Unlimited 15 years ago as a way to plan and assess the organization's stream restoration projects.

After snorkeling the last stretch in Fish Creek, Roberts wades to shore and pulls back his hood. “Seems like numbers are way



TAKING THE PLUNGE

A diver enters the icy waters of the Middle Fork of the Flathead River. Cold, relatively sterile waters like these contain less organic material, making it easier for biologists to count fish and see which habitats they use.

down this year,” he says.

Knotek agrees. “All size classes are down, but the small and medium-sized fish are particularly low,” he says. “That’s likely because there’s less water and less habitat, or because it’s getting fished harder.”

Knotek explains that they would see more small or medium fish if increased mortality from overfishing was the problem. Anglers tend to catch the larger trout, and even though most fish are released, some die from the stress of being caught and handled.

Knotek suspects that low number were caused by the below-average flows of 2021. “Competition for space intensifies, with the bigger fish typically occupying the preferred or remaining holding spots,” he explains. “The small ones may have to relocate or migrate downstream, leading to reduced survival. And that may not bode well for adult trout numbers a few years from now.”

The snorkel survey also confirmed how few non-native fish (brown or brook trout), which can outcompete native species, have moved upstream from the Clark Fork. In

Fish Creek Snorkel Survey Results

YEAR	CUTTHROAT TROUT			MOUNTAIN WHITEFISH (All sizes)	BULL TROUT (All sizes)	OTHER TROUT (All sizes)
	Juvenile (<7 in.)	Sub-adult (7-12 in.)	Adult (>12 in.)			
2009	146	140	123	168	3	7
2010	261	105	141	205	5	21
2011	202	168	117	200	10	24
2014	278	162	216	257	5	38
2017	367	288	294	155	5	20
2021	57	96	162	169	6	14

addition to the westslope cutthroats, the stream contains several native sculpin species as well as mountain whitefish and the federally threatened bull trout. This year, the snorkelers found six bull trout, all sub-adults roughly 14 to 18 inches long, in the two reaches they surveyed, similar to surveys in previous years.

As the Fish Creek survey crew members

return to their pickup, Knotek gestures toward a lone trout angler, his fly line glistening with each cast in the slanting afternoon sunlight. “I’ve handed my mask to anglers on past snorkel surveys to let them look in the pools,” he says. “It’s exciting for them to see all those fish down there. But it’s also humbling when you realize you weren’t able to catch any.” 🐾

SNORKEL MONTANA



Snorkeling is a simple, inexpensive, and novel way to enjoy watery worlds. And it’s not just for exploring coral reefs. People snorkel in freshwater rivers, streams, and lakes, including many in the Treasure State. “Montana has amazing snorkeling spots right in our backyard waters,” says Zach Shattuck, FWP native fish species coordinator.

Shattuck has snorkeled rivers and streams since the mid-1990s. He especially enjoys flipping over underwater rocks to look for small critters like sculpins or watch caddis flies build their tiny casings of sand, sticks, and silk. “I get a kick out of bigger fish, too,” he says. Shattuck has hovered over hundreds of spawning white suckers and watched Arctic grayling cruise past his mask, their tall dorsal fins swaying in the current. He says the prairie creeks in eastern Montana have the state’s greatest fish diversity. “That’s where you see chubs, sticklebacks, dace, darters, shiners, and other species most anglers in this state don’t even know exist,” he says.

The wonders go beyond fish, too. Shattuck sees frogs, toads, crawfish, mink, musk-

rats, otters, and all sorts of waterfowl. Once he floated past a moose drinking from the stream, unaware of his presence.

Montana Outdoors editor Tom Dickson snorkels Spring Meadow Lake in Helena in late summer when the water warms. “As you float over a 30-foot drop-off, you feel like you’re flying,” he says.

Hal Herring, a writer in Augusta, has been snorkeling since he was a kid growing up in Georgia. “Lakes are the most relaxing waters, but big rivers are really fun if you don’t mind getting a bit beat up,” he says.

Herring says snorkeling gives him an “almost unfair” advantage when he swaps his mask for a fishing rod. “You see right where they are and discover how fish really operate. It’s as close as you can get to becoming a fish.”

Herring adds he’d like to see more people snorkeling because it instills a love for rivers and the desire to protect them. “It’s truly an immersive experience,” he says. “If more people experienced water this way, it would create an army of advocates for our rivers who would never back down.” ■

KID FRIENDLY Snorkeling is a fun way for families to explore their local waters. It’s inexpensive, easy, and accessible.



LEFT TO RIGHT: STEVEN GNAM; JEREMY ROBERTS

DIVE IN

Where to go

Get a safe start by snorkeling small, clear streams no wider than 10 feet, or slow spots in bigger rivers. Ponds and small lakes also make great, safer snorkeling spots. Use FWP Fishing Access Sites as easy entry points.



Safety

Wear a life vest, and wading shoes to protect your feet. Don’t venture out in high water, and stay away from rapids and logjams. It’s safest to snorkel with a buddy or two. That also allows you to do a shuttle, leaving one vehicle downstream where you will exit the river or stream.



Comfort

Snorkel in late summer when the water is warmest, especially when exploring trout streams. Wear a tight-fitting merino wool or polypropylene top to keep from getting chilled. Keep warm, dry layers handy to change into afterward.



Gear

A mask and breathing tube costs just \$35 at major outdoor retailers. If you catch the snorkeling bug, consider investing in a neoprene bodysuit, booties, gloves, and hood.



In the water

Ease in slowly and tread lightly (or not at all) to avoid stirring up sediment. Float calmly and slowly so the fish don’t spook. Hold rocks to slow yourself down, and peek beneath rocks and under overhanging banks as you pass by. ■

